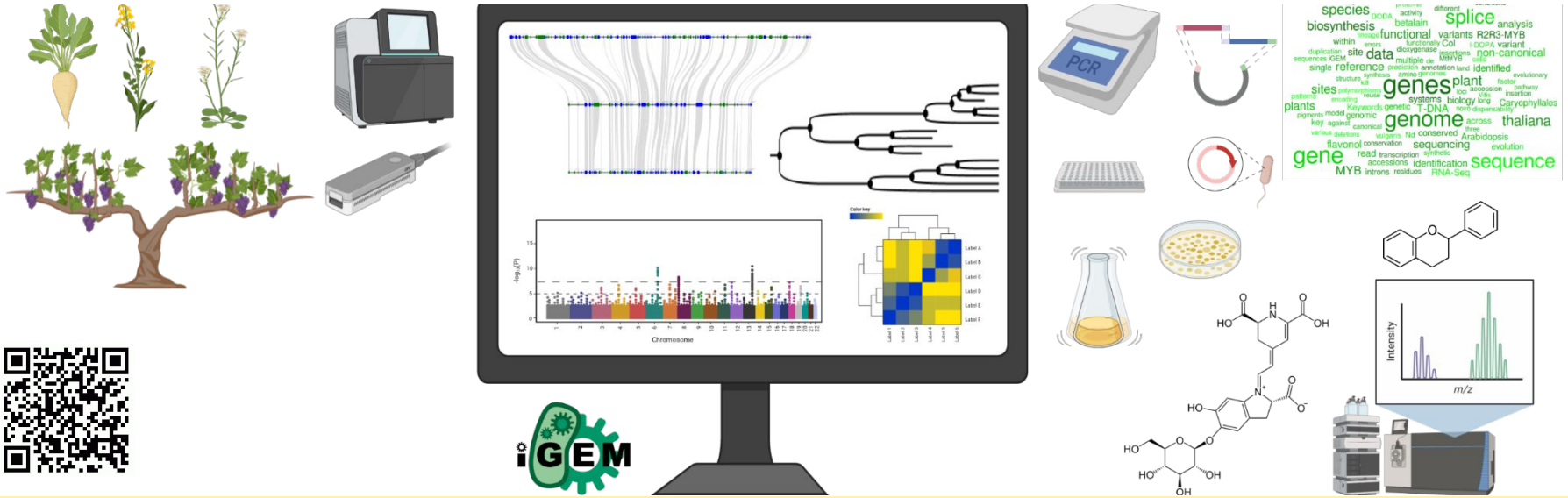
Technische Universität Braunschweig



Python - Modules

Prof. Dr. Boas Pucker (Plant Biotechnology and Bioinformatics)

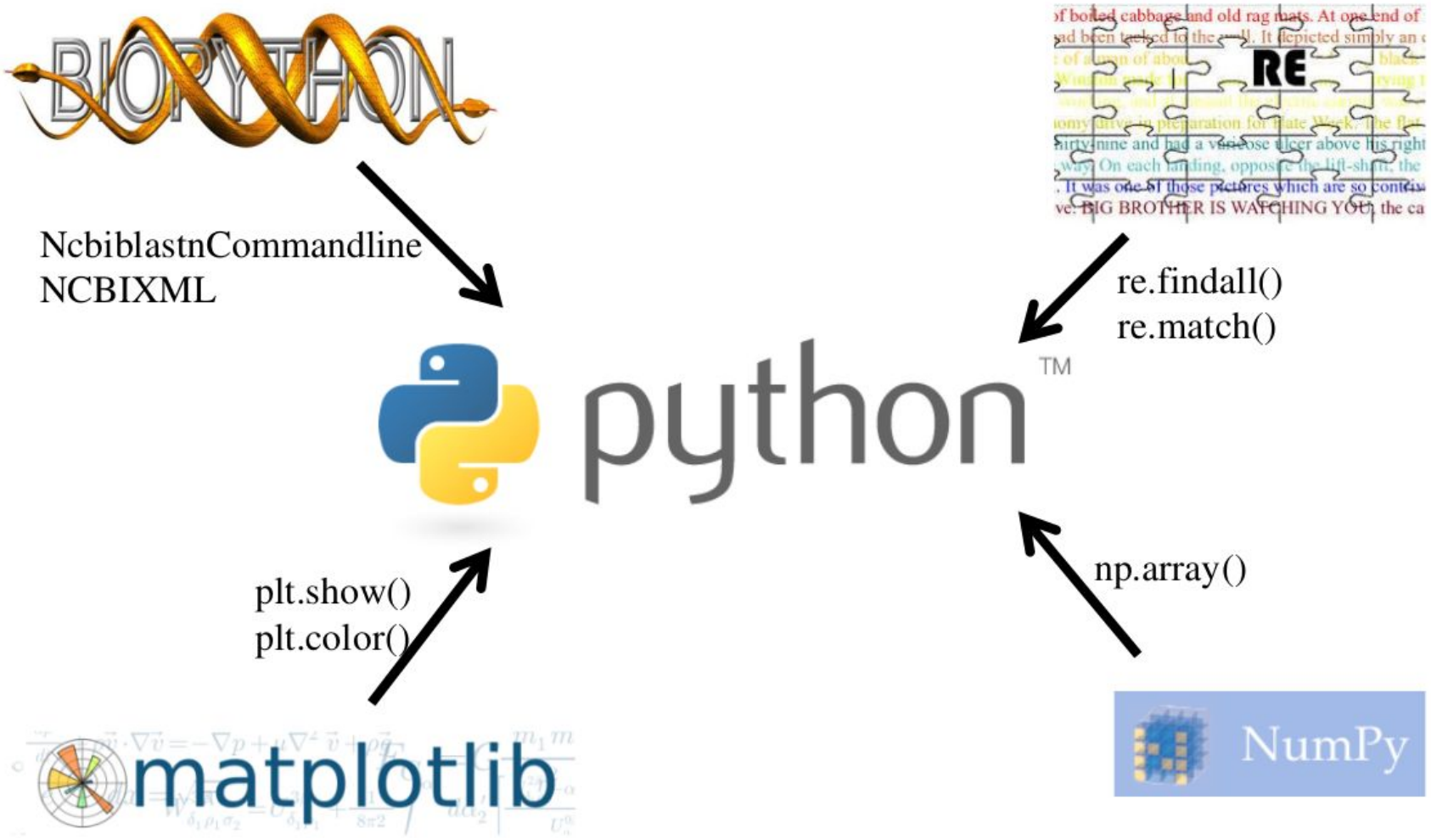
Availability of slides

- All materials are freely available (CC BY) - after the lectures:
  - StudIP: ‘Python for Life Scientists’
  - GitHub: https://github.com/bpucker/teaching

- Questions: Feel free to ask at any time

- Feedback, comments, or questions: b.pucker[a]tu-bs.de

Concept of modules



Importing modules

```
1  #basic import:
2  import re
3  #import of module under abbreviation:
4  import numpy as np
5  #import part of module:
6  from datetime import datetime
7
8  #usage of module functions:
9  re.findall()
10 datetime.now()
11
12 #try this (requires import):
13 print(str( datetime.now() ))
```

Run time calculation

- Current time is saved in two different places
- Difference is calculated to get the run time

```
1  from datetime import datetime
2
3  t1 = datetime.now()
4  #something should happen here
5  t2 = datetime.now()
6
7  print("it took " + str( t2-t1 ))
```

Regular expressions

- Regular expressions (=re) enable efficient search for substrings in a given string

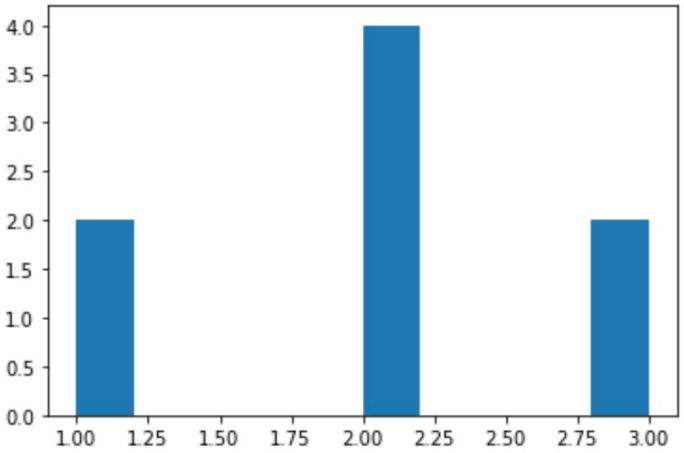
```
1  import re
2  some_string = "AT2G12340.1|exon-1|23745-23965|AT2G12340.2exon-1_23745-23965"
3  hits = re.findall( "AT\dG\d{5}", some_string )  #generates list of hits
4  #searches for "AT\dG\d{5}"
5  #AT, G are matching the very same character
6  #\d is matching all number 0-9
7  #{5} specifies five repetitions of the previous element
8
9  print( hits )
```

- Matching all characters: .
- Matching a defined set of characters/digits: [12345CM]
- Matching 3-5 digits: \d{3,5}

Matplotlib: constructing a histogram

```
import matplotlib.pyplot as plt

data = [1, 1, 2, 2, 2, 2, 3, 3]
plt.hist(data)
```



Exercises - Part5

- 5.1) Write all AGIs of AtCol0_Exons.fasta into a new file!
- 5.2) Some IDs occur multiple times. Add a filter step to reduce the results to unique IDs!
- 5.3) Calculate frequency of each AGI and construct a histogram (matplotlib)!

Other helpful modules

- Plotly: generation of figures
- Dendropy: analysis of phylogenetic trees

Time for questions!